Nov. 1, 1927. 1,647,417

W. G. SCHNEIDER

IGNITION COIL

Filed May 7, 1925

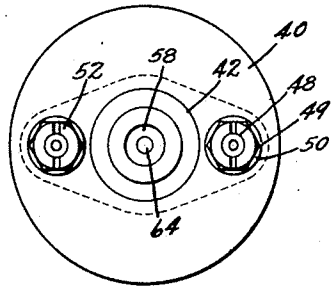

Fig. 1

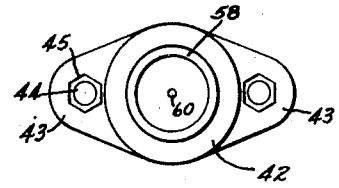

Fig. 3

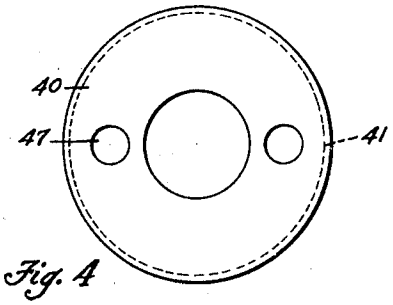

Fig. 4

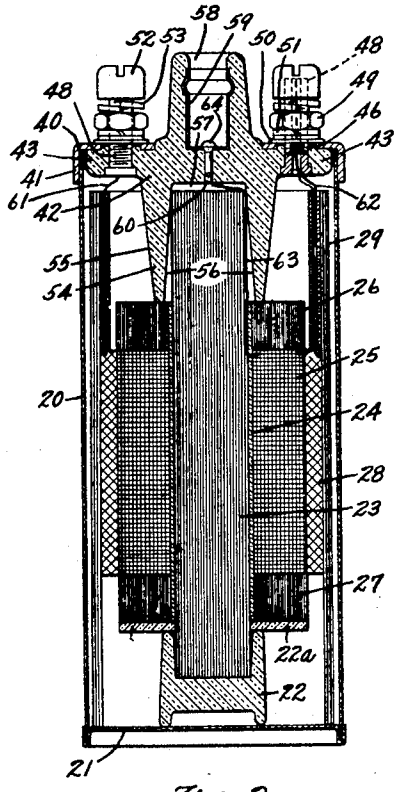

Fig. 2

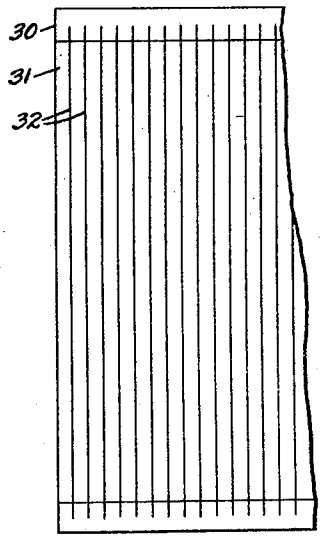

Fig. 5

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UNITED STATES PATENT OFFICE.

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IGNITION COIL.

Application filed May 7, 1925. Serial No. 28,667.

This invention relates to induction coils particularly for electrical ignition apparatus for internal combustion engines. One of the objects of the invention is to produce a more efficient coil at lower cost than heretofore.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a plan view of an embodiment of the present invention.

Fig. 2 is a longitudinal section thereof.

Fig. 3 is a bottom view of a nonconducting body forming a part of the cover of the coil case.

Fig. 4 is a top plan view of the metal ring forming a part of the ignition coil case cover.

Fig. 5 is a fragmentary view showing the material used to provide the external magnetic circuit of the coil.

The case for the ignition coil includes a cylindrical metal case 20 to which is attached a bottom end cover 21 which supports a non-conducting base 22 having a central recess for receiving the ends of a bundle of iron wires 23 which provide the internal core portion of the magnetic circuit of the coil. The wires 23 are surrounded by a non-conducting tube 24 which are surrounded by the secondary coil 25 comprising a plurality of layers of a large number of turns of fine wire separated by paper insulation the margins of which are indicated at 26 and 27. The tube 24 and the paper insulation margins 27 are supported upon a non-conducting disc 22^a which in turn is supported by the non-conducting base 22. The secondary coil 25 is surrounded by the primary coil 28 and the space between the coil 28 and the tube 20 is occupied by a tube of magnetic material 29 which is formed by rolling up a strip of the material shown in Fig. 5. This strip is provided by securing to a strip of paper 30 a strip of soft iron 31. After the glue or paste is thoroughly dry the assembled strips of paper 30 and iron 31 are sheared as indicated on the line 32 which extends through the side margins of the iron strip but not through the margins of the paper strip. This operation provides an assembly including a plurality of parallel iron strips secured to an integral piece of paper. Obviously other types of magnetic circuit can be used. This particular magnetic circuit is described and claimed in the patent of C. E. Wilson, No. 1,641,364, issued Sept. 6, 1927.

The means for closing the upper end of the tubular case includes a metal body or ring 40, having an annular flange 41 which may be soldered to the metal tube 20, and also includes a non-conducting body 42 which may be described as generally tubular and provided with ears 43 by which the body 42 is attached to the metal ring 40. The ears 43 are provided with holes 44 and countersunk recesses 45 which are hexagonal in shape. Around each hole 44, the ears 43 are provided with annular bosses 46 which are received by the holes 47 in the metal ring 40. Through each hole 44 there extends a tubular screw 48 having a hexagonal head which is received by the hexagonal recess 45. Each screw 48 cooperates with a nut 49 to secure to the cover 40, an ear, 43, an insulating washer 50 and a lock washer 51. The threaded portion of the screw 48 which is above the nut 49 is adapted to receive the end of a wire which may be retained in place by a nut 52 retained by a lock washer 53. Below the ears 43 as viewed in Fig. 2 the body 42 is provided with a tubular extension 54 provided with conical external surface 55 and conical internal surface 56 which defines a recess 57. Above the ears 43 as viewed in Fig. 2, the body 42 is provided with a cable receiving socket 58 provided with a conducting lining 59 adapted to receive a metal terminal clip. The recess 57 and the socket 58 are connected by a small opening 60.

The preferred manner of assembling the coil is first to place the base 22, core 23, the tube 24, the coils 25 and 28 within the metal case 20 as shown in Fig. 2. A quantity of sealing pitch such as hydrolene is then poured into the container in order to fill the void spaces below the primary coil 28 and the non-conducting disc 22^a. The external magnetic tube 29 is then placed with the case 20. The lead wire 61 from the outside of the primary 28, and the lead wire 62 from the inside of the primary 28 and from the outside of the secondary 25, and the lead wire 63 from the inside of the

secondary 25 are pulled upwardly from the interior of the can. Then a quantity of the sealing pitch is poured into the can so as to nearly fill it. The lead wires 61 and 62 are threaded through the hollow screws 48, and wire 63 is threaded through the hole 60 and the socket 58. While the pitch is still hot the cover member is forced into the mass of pitch so that the recess 57 is received by the core 23 and so that the cover ring 40 is telescopically engaged by the metal tube 20. One of the functions of the tubular extension 54 of the body 52 is to wedge itself into the sealing pitch and to tend to force the pitch into any void space which may be left in the can. After this has been done the metal ring 40 and metal tube 20 are secured permanently to cable, for example, by soldering. A metal nail 64 is driven through the hole 60 so as to make good electrical connection between the wire 63 and the socket lining 59. Ends of the wire 61 and 62 are cut off flush with the ends of the screws 48 and are soldered thereto.

One of the advantages of the present construction is that the quantity of molded insulating material for supporting and insulating the coil terminals has been substantially reduced. The material required for the upwardly extending tubular part providing a cable receiving socket, a downwardly extending tubular part for receiving the upper end of the center core and for the ears 43, is much less than would be required if the top cover of the case 20 were made entirely of insulating material. The metal ring 40 can be more easily attached to the case 20 than a cover constructed entirely of molded material.

Another advantage of the present invention is that the number of inserts which are required to be molded into the insulating body 42 have been materially reduced. But one molded insert is required namely, the socket lining member 59. The terminal screws 48 are not secured to the ring 40 by molding but by turning the nuts 49 while the screws 48 are prevented from turning by having their hexagonal heads non-rotatably retained within the hexagonal recesses in the ears 43 of the body 42.

While the form of embodiment of the present invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. An induction coil comprising in combination, a casing surrounding a core provided with windings; a metal cover for one end of the casing; a non-conducting body providing a secondary terminal, suspended by the cover, within the casing; and means for attaching said body to the metal cover, said means providing terminal members for the coil.

2. An induction coil comprising, in combination, a tubular case, a magnetizable core supported substantially centrally within the case, insulated primary and secondary windings surrounding the core, a metal cover for one end of the case, a non-conducting body supported by the cover and providing outside of the case a tubular cable receiving socket and secondary terminal and providing within the case a tubular boss snugly fitting about one end of the core so as to hold the same in proper position within the case and extending adjacent the insulation of certain windings, and means for attaching the body to the metal cover said means also providing primary terminal members on said body.

3. An induction coil comprising, in combination, a tubular case, a magnetizable core supported substantially centrally within the case, insulated primary and secondary windings surrounding the core, a metal cover for one end of the case, a non-conducting body located adjacent the inside of the cover and having a tubular cable receiving socket and secondary terminal extending through an opening in the cover, and means for securing the body against the inner surface of the cover, said means including tubular members for receiving wires leading from the coils.

4. An induction coil comprising in combination, a tubular case; metallic end covers for said case; insulating members supported on each end cover within said case, each having recesses coaxial with the case; a core surrounded by windings, the ends of the core extending respectively into the recesses of the insulating members so that the core and windings are supported therebetween, centrally of the case; and means for attaching one of the insulating members to its respective end cover, said means providing terminal members for the coil.

5. An induction coil comprising in combination, a casing surrounding a core provided with windings; a non-conducting body extending into one end of the casing; an apertured, metallic plate engaging the outer surface of the said body and having a flange adapted to fit about the casing and to be secured thereto; and threaded terminal members supported in the non-conducting body and extending through the apertures of the metallic plate and spaced from the edges of the apertures; and nuts upon said terminal members for clamping the metallic plate to said body.

6. An induction coil comprising in combination, a casing surrounding a core provided with windings; a metallic cover for the casing, said cover having a flange portion adapted to fit about the casing and to be secured thereto, also having a central

aperture and a plurality of smaller apertures; a non-conducting body having a portion extending through the central aperture of the cover and providing a terminal receiving socket, and a portion adapted to surround the end of the core to hold it substantially centrally of the casing, said non-conducting body having ears adapted to engage with the inner surface of the metallic cover, said ears having apertured portions extending respectively into the smaller apertures of the cover; and threaded terminal members in said apertured extensions, said studs cooperating with nuts to clamp the non-conducting body to the cover.

7. An induction coil comprising in combination, a tubular case; a metallic cover for one end of the case; an insulating member supported on said cover, provided with a recess forming a receptacle; means for closing the other end of the tubular case and including a non-conducting body having an extension which forms a receptacle within the case; a magnetizable core having its ends extending respectively into the receptacles formed in the insulating member and non-conducting body so as to be supported therebetween and centrally of the case, said core having windings surrounding it; and means for securing the non-conducting body to the case.

I testimony whereof I hereto affix my signature.

WILLIAM G. SCHNEIDER.